

PATENT APPLN. NO. 09/576,211  
RESPONSE UNDER 37 C.F.R. §1.111

PATENT  
NON-FINAL

REMARKS

Claims 1, 12, 27, 38, 53 and 65 have been amended to include the limitations of claims 6, 17, 32, 43, 58 and 70, respectively. Claims 6, 17, 32, 43, 58 and 70 have been cancelled.

Reconsideration and removal of the rejections of the claims made in the Action of February 6, 2003, as reexplained in the communication dated May 1, 2003, are respectfully requested.

Claims 1, 2, 6-13, 17-28, 32-39, 43-54, 58-66 and 70-80 are rejected under 35 U.S.C. §103(a) as being unpatentable over Mabuchi et al. (U.S. Patent No. 6,156,432) ("Mabuchi") in view of Hamada et al. (U.S. Patent No. 6,194,067 B1) ("Hamada").

Claims 3, 4, 14, 15, 29, 30, 40, 41, 55, 56, 67 and 68 are rejected under 35 U.S.C. §103(a) as being unpatentable over Mabuchi and Hamada as applied above to claims 1, 2, 6-13, 17-28, 32-39, 43-54, 58-66 and 70-80, and further in view of Takami et al. (U.S. Patent No. 5,795,678) ("Takami").

Claims 5, 16, 31, 42, 57 and 69 are rejected under 35 U.S.C. §103(a) as being unpatentable over Mabuchi and Hamada as applied above to claims 1, 2, 6-13, 17-28, 32-39, 43-54, 58-66 and 70-80,

PATENT APPLN. NO. 09/576,211  
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**PATENT**  
**NON-FINAL**

and further in view of Tamaki et al. (U.S. Patent No. 5,698,341) ("Tamaki").

Mabuchi discloses a carbon material comprising carbon core particles coated with low or moderately crystalline carbon. Mabuchi does not disclose that the low or moderately crystalline carbon coating contains boron or nitrogen. Hamada discloses carbon particles and fibers coated with a film of boron nitride that are used as the active material for the negative electrode of lithium secondary batteries. The batteries are described as having excellent secondary battery characteristics and improved chemical stability. The position of the Office in each of these grounds of rejection is that it would be obvious, in view of the teachings of Hamada, to add boron and nitrogen to the crystalline carbon coating of the carbon material of Mabuchi to enhance charge/discharge characteristics and improve chemical stability.

The Office has not provided a sufficient showing of motivation for a person of ordinary skill in the art to modify the carbon material of Mabuchi as proposed in the Action.

First, the Office has not shown that the person of ordinary skill in the art would reasonably expect the properties provided by a boron nitride film to be exhibited by a coating of carbon

PATENT APPLN. NO. 09/576,211  
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containing boron or containing boron and nitrogen. Obviousness under 35 U.S.C. § 103(a) requires a reasonable expectation of success. Such a reasonable expectation of success does not exist because Hamada, itself, rebuts such an expectation. Hamada describes that improved chemical stability is achieved by coating a carbon material with a boron nitride thin film and that such properties cannot be provided by carbon containing boron or containing boron and nitrogen (see, for example, Col. 1 line 62 - Col. 2 line 15).

Second, Hamada does not disclose and does not suggest coating carbonaceous particles and carbonaceous fibers with a carbon material containing boron or boron and nitrogen.

In the present invention a second carbon material, which coats an outer surface of a first carbon material, contains boron or contains boron and nitrogen (as recited in the claims). Hamada, however, discloses a boron nitride thin film, which, by definition, is comprised of only boron and nitrogen. In order to clarify this difference, the claims have been amended as explained above to define the amount of boron in the second carbon material.

PATENT APPLN. NO. 09/576,211  
RESPONSE UNDER 37 C.F.R. §1.111

PATENT  
NON-FINAL

The Office has interpreted Hamada as disclosing an amount of boron or nitrogen of from 5 to 30 wt%. However, Hamada describes measurement of the amount of boron and nitrogen of the carbonaceous particles and fibers coated with a film of boron nitride disclosed therein and explains the reason why the concentration of carbon in the surface region "is not zero" (i.e., because carbon in the substrate is simultaneously measured). This statement clearly implies that the amount of carbon in the film should be zero and rebuts the Office's interpretation of the amount of boron and nitride being [only] from 5 to 30 wt% (which would require a minimum of 40 wt% carbon). Therefore, a person of ordinary skill in the art would recognize that the inequality of boron described in Hamada ( $0.05 < C(B) / (C(B) + C(C) + C(N)) < 0.3$ ) is representative of the thickness of the film comprised of boron nitride and not the amount of boron in the second carbon material of the present invention.

In Hamada, since the coating is boron nitride (not carbon containing boron nitride), the amounts of boron and nitrogen of the coating correspond to the the amounts of boron and nitrogen in boron nitride, i.e., 44 and 56 wt.%, respectively. The amount of

PATENT APPLN. NO. 09/576,211  
RESPONSE UNDER 37 C.F.R. §1.111

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boron is outside the range (1-15 wt.%) defined in the claims of the application (as amended herein).

The Office alleges that Hamada teaches the optimization of the amounts of boron, nitrogen and carbon based on the inequalities disclosed therein (Col. 4 of Hamada). However, as noted above, the inequalities disclosed therein are representative of the thickness of the boron nitride film and not its composition.

Further, in the present invention, when the second carbon material (coating) has a boron content of 1-15 wt.% as defined in the amended claims, advantageous effects of excellent storage characteristics are available as indicated by Table 4 and 9. Thus, the invention is not obvious over Mabuchi and Hamada.

For the above reasons, Mabuchi and Hamada do not support a case of prima facie obviousness of claims 1, 2, 6-13, 17-28, 32-39, 43-54, 58-66 and 70-80 and removal of the 35 U.S.C. § 103(a) rejection of these claims is in order.

The claims not included in the rejection of claims 1, 2, 6-13, 17-28, 32-39, 43-54, 58-66 and 70-80 are dependent claims. Since the claims on which these claims depend have been shown to be patentable, these claims are *prima facie* patentable.

PATENT APPLN. NO. 09/576,211  
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**PATENT  
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Moreover, claims 3-5, 14-16, 29-31, 40-42, 55-57 and 67-69 define parameters that optimize the carbon material, the surface of which is coated with the second carbon material containing boron or containing boron and nitrogen. The present application shows that excellent storage characteristics are available when the parameters meet the claimed range (Table 2, 3, 7, and 9).

Finally, it is noted that the Takami and Tamaki references do not overcome the insufficiencies of the Mabuchi and Hamada references (and have been cited only as teaching the limitations of the rejected dependent claims).

Therefore, removal of the 35 U.S.C. § 103(a) rejection of claims 3, 4, 14, 15, 29, 30, 40, 41, 55, 56, 67 and 68, and the 35 U.S.C. § 103(a) rejection of claims 5, 16, 31, 42, 57 and 69 is also in order.

The foregoing is believed to be a complete and proper response to the Office Action dated February 6, 2003, and is believed to place this application in condition for allowance. If, however, minor issues remain that can be resolved by means of a telephone interview, the Examiner is respectfully requested to contact the undersigned attorney at the telephone number indicated below.

PATENT APPLN. NO. 09/576,211  
RESPONSE UNDER 37 C.F.R. §1.111

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In the event that this paper is not considered to be timely filed, applicants hereby petition for an appropriate extension of time. The fee for any such extension may be charged to our Deposit Account No. 111833.

In the event any additional fees are required, please also charge our Deposit Account No. 111833.

Respectfully submitted,

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